



Use of high-resolution GCM simulations for hydrological and hydropower impact research in the Upper Danube basin

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Productive assessments of climate change impact on river discharge and hydropower generation require reliable climate model simulations. Previous initiatives in dynamical downscaling for Europe, in the ENSEMBLES and CORDEX frameworks, provided large ensembles of Regional Climate Model (RCM) data for impact research, at increased horizontal resolution and with improved dissemination to data users. The development of high-resolution Global Climate Models (GCMs) in the framework of the PRIMAVERA project provides a new opportunity to supply robust and reliable climate simulations to the impact research community.

To investigate and enhance the usability of the generated climate data, impact models are developed and applied directly in partnership with selected user groups. The presented contribution showcases an application of first PRIMAVERA climate modelling results in a hydrological model for the Upper Danube basin upstream of Vienna. Historical simulations of precipitation and temperature from six different realizations of the Met Office/Hadley Centre HadGEM3-GC3.1 GCM are provided as input data for monthly hydrological modelling at three horizontal resolutions (100 km, 50 km and 25 km) and for both forced and coupled versions of the climate model. The initial objective of the application is the evaluation of the skill of the different GCM simulations to represent the regional climate at the temporal and spatial scales of the hydrological model. The respective results will also be compared with previous results applying ENSEMBLES and CORDEX RCM data in the same hydrological modelling setup for the Danube at Vienna.

Future investigations will include hydrological simulations of 21st century scenarios based on GCM results with different spatial resolutions, the comparison of future discharge scenarios based on high-resolution GCM projections and RCM projections, and an assessment of the implications for hydropower production along the Danube.